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National Eutrophication Survey, Corvallis, Oreg

Prepared for

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NATIONAL EUTROPHICATION SURVEY

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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Report

on

Lake Apopka

Lake and Orange Counties

Florida

EPA Region IV

Working Paper No. 244

With the cooperation of the

Florida Department of Environmental Regulation

and the

Florida National Guard

October, 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Florida Department of Environmental Regulation for professional involvement and to the Florida National Guard for conducting the tributary sampling phase of the Survey.

Joseph W. Landers, Jr., Secretary of the Department of Environmental Regulation; John A Redmond, former Director of the Division of Planning, Technical Assistance, and Grants; and Dr. Tim S. Stuart, Chief of the Bureau of Water Quality, provided invaluable lake documentation and counsel during the survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

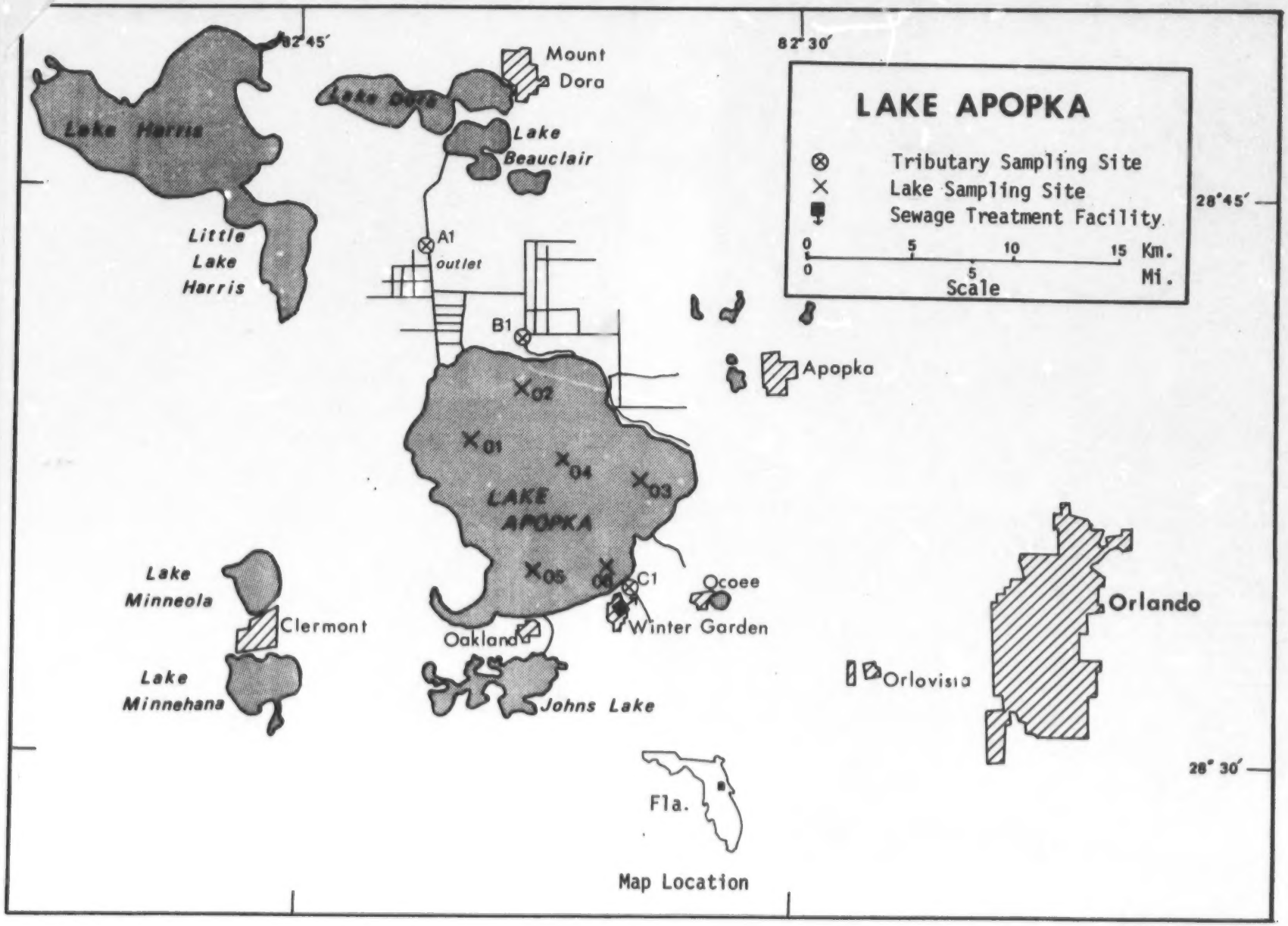
Major General Henry W. McMillan (Retired), then the Adjutant General of Florida, and Project Officer Colonel Hugo F. Windham, who directed the volunteer efforts of the Florida National Guard, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF FLORIDA

LAKE NAME	COUNTY
Alligator	Columbia
Apopka	Lake, Orange
Banana	Polk
Crescent	Flagler, Putnam
Doctors	Clay
Dora	Lake
East Tohopekaliga	Osceola
Effie	Polk
Eloise	Polk
George	Putnam, Volusia
Gibson	Polk
Glenada	Highlands
Griffin	Lake
Haines	Polk
Hancock	Polk
Horseshoe	Seminole
Howell	Orange, Seminole
Istokpoga	Highlands
Jessie	Polk
Jessup	Seminole
Kissimmee	Osceola
Lawne	Orange
Lulu	Polk
Marion	Polk
Minnehaha	Orange
Minneola	Lake
Monroe	Seminole, Volusia
Munson	Leon
Okeechobee	Glades, Hendry, Martin, Okeechobee, Palm Beach
Poinsett	Brevard, Orange, Osceola
Reedy	Polk
Seminole	Jackson, FL; Decatur, Seminole, GA
Seminole	Pinellas
South	Brevard
Talquin	Gladsden, Leon
Tarpon	Pinellas
Thonotosassa	Hillsboro
Tohopekaliga	Osceola
Trout	Lake
Weohyakapka	Polk
Yale	Lake


LAKE APOPKA
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 5 10 15 Km.
0 5 Mi.
Scale
82°45′
82°30′
28°45′
28°30′
Mount Dora
Lake Beauclair
Lake Harris
Little Lake Harris
A1
outlet
B1
Apopka
X02
X01
X04
X03
LAKE APOPKA
X05
X06
C1
Ocoee
Winter Garden
Oakland
Johns Lake
Lake Minneola
Clermont
Lake Minnehana
Orlando
Orlovista
Fla.
Map Location

LAKE APOPKA

STORET NO. 1202

I. CONCLUSIONS

A. Trophic Condition:

Survey data and reports by others (Ketelle and Uttormark, 1971; Shannon and Brezonik, 1972) indicate Lake Apopka is hypereutrophic. It ranked twenty-second in overall trophic quality when the 41 Florida lakes sampled in 1973 were compared using a combination of six lake parameters*. Nineteen of the lakes had less and one had the same median total phosphorus, 12 had less median dissolved phosphorus, 25 had less median inorganic nitrogen, 25 had less mean chlorophyll a, and 36 had greater mean Secchi disc transparency.

Survey limnologists noted numerous patches of water hyacinth and emergent vegetation along the shorelines near all sampling stations. The numbers of blue-green algae in the phytoplankton samples (page 7) further indicate the over-enriched condition of this water body.

B. Rate-Limiting Nutrient:

There was a significant loss of nitrogen in the sample between the time of collection and the beginning of the algal assay, and the results are not representative of the conditions in the lake at the time of sampling.

The lake data indicate phosphorus limitation at all stations in March, nitrogen limitation at most stations in August, and nitrogen limitation at all stations in November.

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* See Appendix A.

C. Nutrient Controllability:

1. Point Sources--During the sampling year, point sources contributed 77.4% of the total phosphorus load and 37.6% of the total nitrogen load to Lake Apopka.

The major portion of the phosphorus load (58.2%) is estimated to have been contributed by muck farms. Previous studies have shown that prevalent agricultural practices contribute significant nutrient loads to the lake (Sheffield, 1969; Huffstutler et al., 1965; Klos, 1973). Other sources of phosphorus include the wastewater treatment plant at Winter Garden, 12.2% of the total; the Winter Garden citrus processing plant, 6.8%; and septic tanks serving lakeshore dwellings, an estimated 0.1%.

The present phosphorus loading of 0.63 g/m^2/year is almost four times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading.

The State of Florida has directed the muck farm operators to initiate on-site retention of stormwater runoff by building holding ponds. At the time of preparation of this report, over half the muck farms had such ponds and no longer discharged to the lake. When stormwater retention is completed, the phosphorus loading should be reduced to 0.26 g/m^2/year (assuming no seepage to the lake). An additional 85% phosphorus removal at the wastewater treatment and citrus processing plants at Winter Garden would further reduce the loading to 0.16 g/m^2/year. These phosphorus reductions

should result in an improvement in the trophic condition of Lake Apopka since the critical phosphorus level for this lake may be somewhat higher than that suggested by Vollenweider (see page 13). The reductions probably would benefit downstream lakes Beauclair and Dora* as well.

2. Non-point sources--Non-point sources accounted for 22.7% of the phosphorus and 62.5% of the nitrogen inputs to the lake during the sampling year. Unnamed Stream B-1 contributed 13.9% of the phosphorus load and 34.3% of the nitrogen load.

Unnamed streams B-1 and C-1 had phosphorus exports of 300 and 569 kg/km^2/year, respectively (see page 13). These rates are much greater than the rate of a tributary of nearby Lake Minneola** (4 kg/km^2/yr) and may be indicative of seepage from the muck farms and citrus groves in the area. For this reason, point-source phosphorus contributions may be greater than those indicated.

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* Working Paper No. 248.
** Working Paper No. 266.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 125.40 kilometers^2.
2. Mean depth: 1.7 meters.
3. Maximum depth: 5.5 meters.
4. Volume: 213.180 x 10^6 m^3.
5. Mean hydraulic retention time: 2.5 years.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Unnamed Stream B-1	36.4**	1.09
Unnamed Stream C-1	1.3	0.27
Agricultural areas** (muck farms and citrus groves)	260.7	-
Minor tributaries & immediate drainage -	52.8	1.37
Totals	351.2	2.73

2. Outlet -

Apopka-Beauclair Canal	476.6***	2.73***

C. Precipitation****:

1. Year of sampling: 126.9 centimeters.
2. Mean annual: 130.1 centimeters.

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† Table of metric equivalents--Appendix B.
†† Clugston, 1963.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Heaney et al., 1972.
*** Includes area of lake; outflow adjusted to equal sum of inflows.
**** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Lake Apopka was sampled three times during 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from six stations on the lake and from one or more depths at each station (see map, page v). During each visit, a single depth-integrated (near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. Only near-surface samples were taken at stations 1, 2, 3, 5, and 6; and the maximum depth sampled at station 4 was 1.8 meters.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE APOPKA
STORET CODE 1202

PARAMETER	1ST SAMPLING (3/12/73) 6 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (9/ 6/73) 6 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/ 7/73) 6 SITES RANGE	MEAN	MEDIAN
TEMP (C)	25.5 - 26.1	25.7	25.5	28.2 - 29.7	28.9	28.9	22.3 - 24.4	23.2	23.2
DISS OXY (MG/L)	10.0 - 11.1	10.4	10.3	6.8 - 11.0	8.8	8.8	8.2 - 10.2	9.5	9.5
CNDCTVY (MCHOMO)	320. - 350.	338.	340.	375. - 400.	388.	392.	355. - 364.	359.	358.
PH (STAND UNITS)	9.4 - 9.5	9.5	9.5	8.7 - 9.0	8.8	8.8	8.9 - 9.5	9.4	9.4
TOT ALK (MG/L)	117. - 123.	120.	120.	114. - 138.	127.	127.	118. - 132.	125.	125.
TOT P (MG/L)	0.083 - 0.124	0.105	0.109	0.093 - 0.319	0.161	0.133	0.072 - 0.115	0.089	0.088
ORTHO P (MG/L)	0.012 - 0.017	0.015	0.015	0.029 - 0.036	0.032	0.031	0.015 - 0.030	0.021	0.019
NO2+NO3 (MG/L)	0.180 - 0.270	0.208	0.200	0.100 - 0.300	0.193	0.185	0.070 - 0.120	0.089	0.090
AMMONIA (MG/L)	0.140 - 0.240	0.168	0.160	0.100 - 0.190	0.140	0.130	0.070 - 0.080	0.074	0.070
KJEL N (MG/L)	3.000 - 3.500	3.200	3.150	4.400 - 5.400	4.850	4.900	3.200 - 3.900	3.557	3.500
INORG N (MG/L)	0.320 - 0.510	0.377	0.360	0.200 - 0.490	0.333	0.315	0.140 - 0.200	0.163	0.160
TOTAL N (MG/L)	3.200 - 3.770	3.408	3.345	4.530 - 5.500	5.043	5.095	3.290 - 4.020	3.646	3.580
CHLRPYL A (UG/L)	25.5 - 39.9	33.7	34.6	18.4 - 105.6	77.9	90.5	22.2 - 39.9	28.2	27.3
SECCHI (METERS)	0.1 - 0.5	0.4	0.5	0.3 - 0.3	0.3	0.3	0.5 - 0.5	0.5	0.5

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Number per ml
03/12/73	1. *Microcystis sp.*	36,000
	2. *Lyngbya sp.*	31,091
	3. *Fragilaria sp.*	3,918
	4. *Aphanocapsa sp.*	3,091
	5. *Merismopedia sp.*	1,636
	Other genera	6,082
	Total	81,818
09/06/73	1. *Lyngbya sp.*	81,433
	2. *Melosira sp.*	3,667
	3. *Microcystis sp.*	3,033
	4. Coccoid blue-green cells	2,450
	5. *Merismopedia sp.*	2,200
	Other genera	12,497
	Total	105,280
11/07/73	1. *Lyngbya sp.*	53,585
	2. *Aphanocapsa sp.*	4,465
	3. *Anabaena sp.*	2,977
	4. *Fragilaria sp.*	2,679
	5. *Nitzschia sp.*	1,786
	Other genera	21,433
	Total	86,925

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (μg/l)
03/12/73	1	33.4
	2	35.9
	3	39.9
	4	25.5
	5	38.1
	6	29.5

Sampling Date	Station Number	Chlorophyll a (µg/l)
09/06/73	1	63.2
	2	18.4
	3	88.4
	4	99.1
	5	105.6
	6	92.7
11/07/73	1	22.2
	2	27.8
	3	23.7
	4	39.9
	5	26.8
	6	28.9

C. Limiting Nutrient Study:

There was a significant loss of nitrogen in the sample between the time of collection and the beginning of the algal assay, and the results are not representative of conditions in the lake at the time of sampling (03/12/73).

The lake data indicate a temporal and spatial combination of limiting nutrients. Following is a tabulation of the mean inorganic nitrogen/orthophosphorus ratios for each station and sampling time with the indicated limiting nutrient in parentheses.

Station	03/12/73	09/06/73	11/07/73
1	22/1 (P)	6/1 (N)	8/1 (N)
2	26/1 (P)	8/1 (N)	10/1 (N)
3	23/1 (P)	17/1 (P)	7/1 (N)
4	27/1 (P)	7/1 (N)	8/1 (N)
5	30/1 (P)	13/1 (N?)	8/1 (N)
6	26/1 (P)	13/1 (N?)	7/1 (N)

IV. NUTRIENT LOADINGS
(See Appendix C for data)

For the determination of nutrient loadings, the Florida National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v). Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Florida District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for the outlet and Unnamed Stream C-1 were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*; nutrient loads for Unnamed Stream B-1 were estimated using the mean concentrations and the mean flow. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for agricultural areas (muck farms and citrus groves) were based on estimates presented in the First Annual Report of the Oklawaha Comprehensive River Basin Study (125.7 kg P/day and 340.1 kg N/day; Anonymous, 1971). Nutrient loads for that portion of the "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) not included in the agricultural areas were estimated using the means of the nutrient exports of the tributaries of nearby lakes Griffin**, and Minneola** (12 kg P and 314 kg N/km^2/year) and multiplying the means by the ZZ area in km^2.

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* See Working Paper No. 175.
** Respectively, Working Paper No. 254 and 266.

The nutrient loads measured in Apopka-Beauclair Canal at station A-1 may have been somewhat higher than the loads at the outlet of Apopka Lake due to discharges from muck farms along the canal upstream from the sampling site (Sheffield, 1969; see map page v). For this reason, accumulation of nutrients in the lake could have been greater than shown on the following pages.

The operator of the Winter Garden wastewater treatment plant provided monthly effluent samples and corresponding flow data.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Winter Garden	6,800	trickling filter	2,661.7	Unnamed Stream C-1

2. Known industrial and agricultural** -

Name	Treatment	Mean Flow (m^3/d)	Receiving Water
Winter Garden Citrus Cooperative	unknown	5,678.1	Unnamed Stream C-1
Zellwood Vegetable Farms	none	1,779.1***	Lake Apopka
Duda and Sons Golden Gem Growers	none		Lake Apopka

* Treatment plant questionnaire.
** Anonymous, 1971.
*** Flow regulated by irrigation; combined flow reported based on that pumped directly to Lake Apopka from farming area (see page 9).

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Unnamed Stream B-1	10,925	13.9
Unnamed Stream C-1	740	0.9
b. Minor tributaries & immediate drainage (non-point load) -	635	0.9
c. Known municipal STP's -		
Winter Garden	9,645	12.2
d. Septic tanks* -	80	0.1
e. Known industrial** -		
Winter Garden Citrus	5,395	6.8
f. Known agricultural** -		
Muckland farming and citrus groves	45,870	58.2
g. Direct precipitation*** -	5,520	7.0
Total	78,810	100.0

2. Outputs -

Lake outlet - Apopka-Beauclair Canal 35,925

3. Net annual P accumulation - 42,885 kg.

* Estimate based on 274 shoreline dwellings; see Working Paper No. 175.
** Anonymous, 1971.
*** Brezonik and Shannon, 1971.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Unnamed Stream B-1	143,650	34.4
Unnamed Stream C-1	27,640	6.6
b. Minor tributaries & immediate drainage (non-point load) -	16,580	4.0
c. Known municipal STP's -		
Winter Garden	24,100	5.8
d. Septic tanks* -	2,920	0.7
e. Known industrial** -		
Winter Garden Citrus	5,960	1.4
f. Known agricultural** -		
Muckland farming and citrus groves	124,150	29.7
g. Direct precipitation*** -	72,730	17.4
Total	417,730	100.0

2. Outputs -

Lake outlet - Apopka-Beauclair canal 354,670

3. Net annual N accumulation - 63,060 kg.

* Estimate based on 274 shoreline dwellings; see Working Paper No. 175.
** Anonymous, 1971.
*** Brezonik and Shannon, 1971.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Unnamed Stream B-1	300	3,946
Unnamed Stream C-1	569	21,262

E. Yearly Loads

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Note, however, that Florida lakes may be able to assimilate phosphorus at a somewhat higher level than that suggested by Vollenweider (Shannon and Brezonik, 1972).

Essentially, Vollenweider's "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	0.63	0.34	3.3	0.5

Vollenweider phosphorus loadings (g/m²/yr) based on mean depth and mean hydraulic retention time of Lake Apopka:

"Dangerous" (eutrophic loading)	0.16
"Permissible" (oligotrophic loading)	0.08

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1201	ALLIGATOR LAKE	0.620	0.260	474.000	87.733	13.100	0.386
1202	LAKE APOPKA	0.102	0.230	484.176	46.611	8.200	0.019
1203	LAKE BANANA	0.660	0.260	482.667	208.600	3.600	0.293
1206	LAKE CRESCENT	0.065	0.130	473.889	10.211	10.200	0.033
1207	DOCTORS LAKE	0.084	0.120	465.555	27.100	10.600	0.028
1208	LAKE DORA	0.102	0.240	482.889	59.978	7.400	0.022
1209	LAKE EFFIE	1.480	0.410	489.000	261.433	15.000	0.950
1210	LAKE GEORGE	0.129	0.165	469.308	35.000	11.000	0.063
1211	LAKE GIBSON	0.167	0.115	470.000	19.675	10.200	0.069
1212	GLENADA LAKE	0.134	0.165	454.167	27.667	14.700	0.072
1214	LAKE GRIFFIN	0.119	0.260	481.333	66.855	6.600	0.038
1215	LAKE HAINES	0.063	0.115	462.667	26.567	10.600	0.014
1217	LAKE HANCOCK	0.772	0.195	483.500	97.900	5.600	0.158
1219	LAKE HORSESHOE	0.034	0.130	459.000	12.067	11.500	0.023
1220	LAKE HOWELL	1.260	0.285	464.000	54.117	9.000	1.175
1221	LAKE ISTOKPOGA	0.039	0.120	464.222	6.594	8.600	0.010
1223	LAKE JESSUP	0.492	0.290	487.000	76.550	7.600	0.288
1224	LAKE KISSIMMEE	0.034	0.145	463.667	24.142	8.800	0.007
1227	LAKE LULU	1.490	1.065	483.000	276.566	14.300	1.030
1228	LAKE MARION	0.044	0.260	468.833	29.967	7.600	0.016
1229	LAKE MINNEHAHA	0.038	0.080	435.000	8.733	7.700	0.012
1230	LAKE MINNEOLA	0.018	0.070	406.333	3.333	7.400	0.009
1231	LAKE MONROE	0.188	0.300	474.555	14.225	10.800	0.128
1232	LAKE OKEECHOBEE	0.063	0.185	472.366	14.524	9.800	0.010
1234	LAKE POINSETT	0.085	0.150	469.000	6.500	10.600	0.051
1236	LAKE REEDY	0.033	0.330	468.500	34.837	10.600	0.008
1238	LAKE SOUTH	0.074	0.130	464.000	23.167	9.000	0.028
1239	LAKE TALQUIN	0.085	0.290	462.167	9.483	14.400	0.031

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1240	LAKE THONOTOSASSA	0.695	0.095	466.167	37.700	10.200	0.565
1241	LAKE TOHOPEKALIGA	0.246	0.200	472.917	30.633	10.500	0.152
1242	TROUT LAKE	1.110	0.650	472.000	76.967	12.900	0.970
1243	LAKE WEOHYAKAPKA	0.047	0.080	458.667	7.767	8.200	0.011
1246	LAKE YALE	0.027	0.160	441.000	25.367	7.600	0.014
1247	LAKE HUNSON	1.475	0.925	486.667	140.317	12.200	0.852
1248	LAKE SEMINOLE	0.234	0.175	473.833	102.000	8.600	0.026
1249	LAKE LAWNE	2.560	1.350	494.667	84.900	10.400	0.117
1250	LAKE TARPON	0.041	0.070	400.889	6.867	9.000	0.027
1252	LAKE ELOISE	0.486	0.170	465.333	70.233	12.200	0.339
1258	LAKE JESSIE	0.051	0.090	452.667	26.300	10.800	0.011
1261	EAST LAKE TOHOPEKALIGA	0.042	0.070	440.833	5.167	9.400	0.007
1264	PAYNE'S PRAIRIE LAKE (NO	1.260	0.140	476.000	88.200	7.400	1.210

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1201	ALLIGATOR LAKE	25 (10)	29 (10)	30 (12)	18 (7)	10 (4)	18 (7)	130
1202	LAKE APOPKA	50 (20)	38 (15)	10 (4)	38 (15)	74 (29)	70 (28)	280
1203	LAKE BANANA	23 (9)	29 (10)	20 (8)	5 (2)	100 (40)	23 (9)	200
1206	LAKE CRESCENT	65 (26)	70 (27)	33 (13)	80 (32)	48 (18)	50 (20)	346
1207	DOCTORS LAKE	60 (24)	76 (30)	60 (24)	55 (22)	34 (12)	56 (22)	341
1208	LAKE DORA	53 (21)	35 (14)	18 (7)	33 (13)	90 (35)	68 (27)	297
1209	LAKE EFFIE	5 (2)	10 (4)	3 (1)	3 (1)	0 (0)	10 (4)	31
1210	LAKE GEORGE	45 (18)	54 (21)	48 (19)	43 (17)	23 (9)	43 (17)	256
1211	LAKE GIBSON	40 (16)	81 (32)	45 (18)	70 (28)	48 (18)	40 (16)	324
1212	GLENADA LAKE	43 (17)	54 (21)	85 (34)	53 (21)	3 (1)	38 (15)	276
1214	LAKE GRIFFIN	48 (19)	29 (10)	23 (9)	30 (12)	95 (38)	48 (19)	273
1215	LAKE HAINES	70 (28)	81 (32)	75 (30)	58 (23)	34 (12)	78 (31)	396
1217	LAKE HANCOCK	18 (7)	43 (17)	13 (5)	13 (5)	98 (39)	28 (11)	213
1219	LAKE HORSESHOE	93 (37)	70 (27)	80 (32)	78 (31)	20 (8)	65 (26)	406
1220	LAKE HOWELL	11 (4)	23 (9)	69 (27)	35 (14)	60 (23)	3 (1)	201
1221	LAKE ISTOKPOGA	85 (34)	76 (30)	65 (26)	93 (37)	69 (27)	89 (35)	477
1223	LAKE JESSUP	28 (11)	18 (7)	5 (2)	25 (10)	83 (32)	25 (10)	184
1224	LAKE KISSIMMEE	90 (36)	63 (25)	73 (29)	65 (26)	65 (26)	99 (39)	455
1227	LAKE LULU	3 (1)	3 (1)	15 (6)	0 (0)	8 (3)	5 (2)	34
1228	LAKE MARION	78 (31)	29 (10)	53 (21)	50 (20)	83 (32)	73 (29)	366
1229	LAKE MINNEHAHA	88 (35)	91 (36)	95 (38)	85 (34)	78 (31)	80 (32)	517
1230	LAKE MINNEOLA	100 (40)	98 (38)	98 (39)	100 (40)	90 (35)	93 (37)	579
1231	LAKE MONROE	38 (15)	15 (6)	28 (11)	75 (30)	26 (10)	33 (13)	215
1232	LAKE OKEECHOBEE	68 (27)	45 (18)	40 (16)	73 (29)	53 (21)	89 (35)	368
1234	LAKE POINSETT	58 (23)	60 (24)	50 (20)	95 (38)	34 (12)	45 (18)	342
1236	LAKE REEDY	95 (38)	13 (5)	55 (22)	45 (18)	34 (12)	95 (38)	337
1238	LAKE SOUTH	63 (25)	70 (27)	69 (27)	68 (27)	60 (23)	56 (22)	386
1239	LAKE TALQUIN	55 (22)	20 (8)	78 (31)	83 (33)	5 (2)	53 (21)	294

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NO
1240	LAKE THONOTOSASSA	20 (8)	85 (34)	58 (23)	40 (16)	48 (18)	15 (6)	266
1241	LAKE TOHOPEKALIGA	33 (13)	40 (16)	38 (15)	48 (19)	40 (16)	30 (12)	229
1242	TROUT LAKE	15 (6)	8 (3)	43 (17)	23 (9)	13 (5)	8 (3)	110
1243	LAKE WEOHYAKAPKA	75 (30)	91 (36)	83 (33)	88 (35)	74 (29)	84 (33)	495
1246	LAKE YALE	98 (39)	58 (23)	90 (36)	63 (25)	83 (32)	75 (30)	467
1247	LAKE MUNSON	8 (3)	5 (2)	8 (3)	8 (3)	16 (6)	13 (5)	58
1248	LAKE SEMINOLE	35 (14)	48 (19)	35 (14)	10 (4)	69 (27)	63 (25)	260
1249	LAKE LAWNE	0 (0)	0 (0)	0 (0)	20 (8)	43 (17)	35 (14)	98
1250	LAKE TARPON	83 (33)	98 (38)	100 (40)	90 (36)	60 (23)	60 (24)	491
1252	LAKE ELOISE	30 (12)	50 (20)	63 (25)	28 (11)	16 (6)	20 (8)	207
1258	LAKE JESSIE	73 (29)	88 (35)	88 (35)	60 (24)	26 (10)	84 (33)	419
1261	EAST LAKE TOHOPEKALIGA	80 (32)	98 (38)	93 (37)	98 (39)	55 (22)	99 (39)	523
1264	PAYNE'S PRAIRIE LAKE (NO	11 (4)	65 (26)	25 (10)	15 (6)	90 (35)	0 (0)	206

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1230	LAKE MINNEOLA	579
2	1261	EAST LAKE TOHOPEKALIGA	523
3	1229	LAKE MINNEHAHA	517
4	1243	LAKE WEOHYAKAPKA	495
5	1250	LAKE TARPON	491
6	1221	LAKE ISTOKPOGA	477
7	1246	LAKE YALE	467
8	1224	LAKE KISSIMMEE	455
9	1258	LAKE JESSIE	419
10	1219	LAKE HORSESHOE	406
11	1215	LAKE HAINES	396
12	1238	LAKE SOUTH	386
13	1232	LAKE OKEECHOBEE	368
14	1228	LAKE MARION	366
15	1206	LAKE CRESCENT	346
16	1234	LAKE POINSETT	342
17	1207	DOCTORS LAKE	341
18	1236	LAKE REEDY	337
19	1211	LAKE GIBSON	324
20	1208	LAKE DORA	297
21	1239	LAKE TALQUIN	294
22	1202	LAKE APOPKA	280
23	1212	GLENADA LAKE	276
24	1214	LAKE GRIFFIN	273
25	1240	LAKE THONOTOSASSA	266
26	1248	LAKE SEMINOLE	260
27	1210	LAKE GEORGE	56
28	1241	LAKE TOHOPEKALIGA	29

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	1231	LAKE MONROE	215
30	1217	LAKE HANCOCK	213
31	1252	LAKE ELOISE	207
32	1264	PAYNE'S PRAIRIE LAKE (NO	206
33	1220	LAKE HOWELL	201
34	1203	LAKE BANANA	200
35	1223	LAKE JESSUP	184
36	1201	ALLIGATOR LAKE	130
37	1242	TROUT LAKE	110
38	1249	LAKE LAWNE	98
39	1247	LAKE MUNSON	58
40	1227	LAKE LULU	34
41	1209	LAKE EFFIE	31

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR FLORIDA 8/25/75

LAKE CODE 1202 LAKE APOPKA

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 476.6

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1202A1	476.6	2.89	3.62	3.99	4.11	2.07	2.49	2.38	3.54	4.33	2.44	2.10	1.70	2.96
1202B1	0.0	0.82	1.42	0.91	0.48	0.34	2.41	1.50	1.73	1.33	0.96	0.42	0.79	1.09
1202C1	1.3	0.35	0.36	0.36	0.36	0.35	0.35	0.15	0.16	0.16	0.16	0.16	0.35	0.27
1202ZZ	0.0	3.71	4.81	3.14	1.64	-0.03	-0.99	-0.82	3.09	-0.71	-0.25	2.86	0.28	1.37

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 476.6
SUM OF SUB-DRAINAGE AREAS = 1.3

TOTAL FLOW IN = 33.11
TOTAL FLOW OUT = 35.65

NOTE *** NEGATIVE ZZ FLOWS INDICATE OUTFLOW--DRAINAGE AREAS OF ZZ AND B1 UNKNOWN

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1202A1	3	73	2.61	17	3.68				
	4	73	0.71	8	0.71	7	0.0		
	5	73	0.79	20	0.71	12	0.0		
	6	73	0.71	18	0.71	17	0.0		
	7	73	0.71						
	8	73	0.71	5	0.0				
	9	73	0.71	15	0.71	8	0.0		
	10	73	2.89						
	11	73	2.29	4	4.59	3	0.0		
	12	73	0.71	9	0.71	8	0.0	15	0.0
	1	74	0.71	6	0.71				
	2	74	0.71	2	0.71				
1202C1	3	73	0.37	17	0.37				
	4	73	0.37	7	0.37	8	0.37		
	5	73	0.34	12	0.34	20	0.34		
	6	73	0.34	17	0.34	18	0.34		
	7	73	0.17	8	0.17				
	8	73	0.17	5	0.17				
	9	73	0.20	8	0.20	15	0.20		
	10	73	0.17						
	11	73	0.17	3	0.17	4	0.17		
	12	73	0.34	8	0.34	15	0.34	9	0.34
	1	74	0.37	6	0.37				
	2	74	0.37	2	0.37				

TRIBUTARY FLOW INFORMATION FOR FLORIDA 8/25/75

LAKE CODE 1202 LAKE APOPKA

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1202ZZ	3	73	-1.67						
	4	73	0.06						
	5	73	-1.19						
	6	73	-4.42						
	7	73	-2.61						
	8	73	0.91						
	9	73	5.61						
	10	73	-3.03						
	11	73	-0.14						
	12	73	0.54						
	1	74	1.47						
	2	74	-1.42						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/08/25

120201
28 38 01.0 081 40 02.0
LAKE APOPKA
12069 FLORIDA

11EPALES 2111202
3 0005 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	12 05	0000	26.1	10.4	18	350	9.40	120	0.160	3.100	0.190	0.016
73/09/06	09 25	0000	28.2	6.8		377	8.70	134	0.100	5.400	0.100	0.034
73/11/07	14 30	0000	23.4	10.2	20	356	9.30	125	0.070	3.300	0.070	0.017

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	12 05	0000	0.083	33.4
73/09/06	09 25	0000	0.169	63.2
73/11/07	14 30	0000	0.080	22.2

38

STORET RETRIEVAL DATE 75/08/25

120202
28 39 39.0 081 38 13.0
LAKE APOPKA
12095 FLORIDA

11EPALES
3

2111202
0005 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	12 30	0000	25.5	10.4	14	340	9.50	123	0.160	3.000	0.200	0.014
73/09/06	09 05	0000	28.3	7.0	12	391	8.80	138	0.100	4.400	0.130	0.030
73/11/07	14 40	0000	22.6	10.2	20	355	9.50	129	0.070	3.500	0.080	0.015

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	12 30	0000	0.124	35.9
73/09/06	09 05	0000	0.140	18.4
73/11/07	14 40	0000	0.072	27.8

STORET RETRIEVAL DATE 75/08/25

120203
28 37 30.0 081 33 49.0
LAKE APOPKA
12095 FLORIDA

11EPALES 2111202
3 0004 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	13 00	0000	25.5	10.0	5	350	9.50	121	0.150	3.300	0.210	0.016
73/09/05	16 15	0000	29.5	10.0	10	400	8.70	119	0.190	4.500	0.300	0.029
73/11/07	14 50	0000	22.9	9.6	20	360	9.50	132	0.080	3.800	0.090	0.024

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	13 00	0000	0.121	39.9
73/09/05	16 15	0000	0.117	88.4
73/11/07	14 50	0000	0.090	23.7

30

STORET RETRIEVAL DATE 75/08/25

120204
28 37 35.0 081 37 40.0
LAKE APOPKA
12095 FLORIDA

11EPALES
3

2111202
0005 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	12 45	0000	25.5	10.0	18	340	9.50	119	0.140	3.100	0.180	0.012
73/09/06	09 40	0000	28.2	7.6	12	392	8.80	137	0.100	4.900	0.120	0.031
73/11/07	14 15	0000	24.4		20	360	9.50	125	0.070	3.200	0.090	0.017
	14 15	0006	22.3	8.2		358	8.90	118	0.080	3.900	0.120	0.030

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	12 45	0000	0.086	25.5
73/09/06	09 40	0000	0.093	99.1
73/11/07	14 15	0000	0.075	39.9
	14 15	0006	0.115	

STORET RETRIEVAL DATE 75/08/25

120205
28 34 30.0 081 38 05.0
LAKE APOPKA
12095 FLORIDA

11EPALES
3

2111202
0005 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	14 40	0000	26.0	10.3	18	330	9.50	120	0.240	3.500	0.270	0.017
73/09/05	16 40	0000	29.6	10.2	12	375	9.00	114	0.160	5.000	0.240	0.031
73/11/07	14 00	0000	23.3	9.4	20	357	9.40	121	0.070	3.300	0.080	0.019

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	14 40	0000	0.098	38.1
73/09/05	16 40	0000	0.126	105.6
73/11/07	14 00	0000	0.088	26.8

STORET RETRIEVAL DATE 75/08/25

120206
28 35 03.0 081 35 25.0
LAKE APOPKA
12095 FLORIDA

11EPALES
3

2111202
0004 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/12	15 00	0000		11.1	18	320	9.50	117	0.160	3.200	0.200	0.014
73/09/05	16 25	0000	29.7	11.0	12	395	8.80	119	0.190	4.900	0.270	0.036
73/11/07	13 55	0000	23.2	9.2	20	364	9.40	125	0.080	3.900	0.090	0.025

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/12	15 00	0000	0.120	29.5
73/09/05	16 25	0000	0.319	92.7
73/11/07	13 55	0000	0.102	28.9

APPENDIX E

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/08/25

1202A1
28 43 30.0 081 41 00.0
APOPKA BEAUCLAIR CANAL
12023 7.5 ASTATULA
O/LAKE APOPKA
BRDG BELO LK APOPKA LOCK AND DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/17	10 33		0.044	8.200	0.405	0.320	0.720
73/04/08	10 30		0.198	3.600	0.200	0.399	0.480
73/05/20	09 30		0.016	4.600	0.079	0.072	0.250
73/06/18	12 00		0.036	3.500	0.028	0.055	0.240
73/09/15	08 00		0.105	3.100	0.370	0.535	0.600
73/11/04	09 35		0.250	2.300	0.425	0.094	0.210
73/12/09	10 30		0.740	1.600	0.056	0.252	0.270
74/01/06	10 00		0.184	1.700	0.096	0.224	0.320
74/02/02	11 20		0.740	2.300	0.010	0.210	0.280

STORET RETRIEVAL DATE 75/08/25

120281
28 41 00.0 081 38 00.0
UNNAMED CANAL
12 7.5 ASTATULA
T/LAKE APOPKA
E SIDE LEVEE BTWN LK & MCDONALD CANAL
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/17	10 00		0.023	2.200	0.069	0.120	0.180
73/04/08	10 00		5.500	3.200	0.390		0.826
73/05/20	09 05		0.025	2.400	0.074	0.063	0.110
73/06/18	11 45		0.015	3.200	0.120	0.060	0.145

36

1202C1
28 34 30.0 081 35 00.0
UNNAMED STREAM
12 7.5 WINTER GARDE
T/LAKE APOPKA
HWY BRDG E OF LAKEVIEW PARK
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/17	10 30		0.010K	12.000	0.060	0.580	2.300
73/04/07	12 33		0.033	6.100	0.130	0.390	1.300
73/05/12	10 40		0.018	8.500	0.016	0.025	1.000
73/06/17	08 35		0.015	2.700	0.021	0.066	0.540
73/07/08	11 05		0.048	0.780	0.148	0.054	0.150
73/08/05	14 30		7.700	17.000	3.200	1.300	3.600
73/09/08	12 50		1.100	1.800	0.630	0.260	0.360
73/11/03	15 05		0.147	0.600	0.073	0.132	0.420
73/12/08	09 55		0.024	1.200	0.020	0.120	0.410
73/12/15	10 05		0.004	1.400	0.024	0.120	0.640
74/01/06	11 15		0.020	5.000	0.016	0.032	0.780
74/02/02	12 15			31.000			3.000

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/08/25

1202CA TF1202CA P006800
28 34 30.0 081 35 00.0
WINTER GARDEN
12023 7.5 WINTER GARDE
D/LAKE APOPKA
LAKE APOPKA
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/02/15	08 00								
CP(T)-			1.500	25.000	11.600	7.300	8.900	0.730	0.770
73/02/15	17 00								
73/03/15	08 00								
CP(T)-			0.660	33.000	14.000	9.300	9.600	0.680	0.670
73/03/15	17 00								
73/04/12	09 00								
CP(T)-			6.300	26.000	13.700	8.000	9.600	0.670	0.750
73/04/12	17 00								
73/05/17	11 00		5.850	17.600	8.200	8.100	9.400	0.750	0.640
73/06/21	08 00								
CP(T)-			6.300	16.000	6.500	9.300	10.300	0.660	0.650
73/06/21	17 00								
73/07/11	08 00								
CP(T)-			1.680	18.900	10.000	9.900	11.500	0.650	0.621
73/07/11	17 00								
73/08/15	08 00								
CP(T)-			3.200	13.600	3.160	9.000		0.620	0.660
73/08/15	17 00								
73/09/12	08 00								
CP(T)-			5.700	11.500	2.660	2.700	7.400	0.820	0.890
73/09/12	17 00								
73/10/17	09 00								
CP(T)-			4.300	15.000	3.450	8.450	8.600	0.730	0.750
73/10/17	16 00								
73/11/14	08 00								
CP(T)-			6.900	16.000	5.300	9.100	9.600	0.690	0.690
73/11/14	17 00								
73/12/12	09 00								
CP(T)-			2.800	28.000	27.000	8.600	12.000	0.690	0.710
73/12/12	16 00								
74/01/16	10 00		6.300	26.000	9.000	9.000	11.000	0.700	0.690
74/02/20	09 00								
CP(T)-			5.100	20.000	9.700	8.600	11.300	0.700	0.650
74/02/20	16 00								